Small Business Lending and the Bank-Branch Network

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Abstract

This paper asks two questions: i) how does the proximity and relative amount of lending by competitors affect where a bank with a local capital shock adjusts supply of credit? ii) do credit supply shocks have a lower impact on real activity if they help the bank compete in the core markets of other lenders? Evidence shows that positive shocks help offset distance-based information disadvantage and target markets far from own branches and close to competitors' branches. Negative shocks occur in competitive, low-share markets with lower marginal return. Activity increases significantly in concentrated markets when banks expand in their own or competitors' core markets. Residential booms decrease lending but do not reduce activity.

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1 Introduction

Banks frequently provide credit to a segment of the market with significant information frictions. When lending locally, soft information gives banks an advantage in the proximity of their branches and allows for increased competition at the periphery, where others gain an advantage.[1] Additional capital provides lenders an opportunity to expand their lending portfolio close to competitors or in their own core markets, far from other lenders. Similarly, when capital decreases, banks can reduce lending in either of the markets. The way capital shocks are allocated to markets with different level of competition, has an implication for the segmentation of credit markets and for the role of physical branches in preventing lending from competing banks. For example, if a bank with additional capital does not lend more close to the branches of a competitor, lending in the proximity is likely more expensive. The existing evidence shows that branches minimize contracting frictions due to own distance to borrowers.[2] At the same time, there is less evidence about the role of branches in *increasing* contracting frictions for other competing banks.

This paper asks two questions: i) how does the proximity and relative amount of lending by competitors affect where a bank with a local capital shock adjusts the supply of credit? ii) do credit supply shocks have a lower impact on real activity if they help the bank compete in the core markets of other lenders? According to the literature on local lending, the share of originations in a given location depends on the lender's own distance to the borrower and the distance of the borrower to other banks.[3] The insight provides a starting point for the empirical analysis in this paper and is key to how I distinguish which markets see credit supply changes after two local capital shocks. I explicitly incorporate measures of bank-borrower/competitor-borrower distance and the share of lending at the borrower's census

[1]See Dell'Ariccia (2001) and Hauswald and Marquez (2006). Degryse and Ongena (2005) and Agarwal and Hauswald (2010) show that competition increases with borrower-distance/competitor-proximity. The loan share decreases as the information advantage erodes and the bank cannot offer sufficiently low rates.

[2]See Gilje et al. (2016), Cortés and Strahan (2017) among others.

[3]This is caused by the superior soft information that a lender can generate when they are close to the borrower. See Brevoort and Hannan (2006), Degryse and Ongena (2005), Hauswald and Marquez (2006), and Agarwal and Hauswald (2010) for a discussion of the importance of borrower distance.

tract as measures of local competition. Both can explain where and how much a bank lends *within* and *across* counties and how much credit supply and real activity shift after capital shocks. The existing literature primarily focuses on whether lending changes in counties with/without own branches, identifying the role of the own distance-to-borrower information advantage in a starkly discontinuous way.[4] This ignores the presence of other lenders and does not explain how credit is allocated *within* or *across* counties with branches.[5] Degryse and Ongena (2005) and Agarwal and Hauswald (2010) show that the location of other lenders is key to where a bank lends. Furthermore, Cortés and Strahan (2017) suggests that, for smaller banks, most of mortgage lending is close to branches, implying that loans in no-branch counties make up a small fraction of the portfolio.[6] Therefore, the existing evidence does not explain how capital shocks are distributed across the markets where banks lend the most and whether the location of other lenders plays an important role.

My main results examine small business loans by regional banks which face incentives to reallocate capital due to their exposure to fracking windfalls and residential booms. I explore a different credit segment relative to the existing evidence, which focuses on mortgage lending. Business lending is more local, is subject to higher information frictions, and can be directly linked to employment outcomes. I use a novel dataset that combines the joint spatial distribution of borrowers and lenders, and identifies lending in each census tract by branches of each bank. This level of detail allows me to measure how far other lenders are and what their share of lending within each tract is. I estimate a difference-in-difference model, which relies on the significant existing variation to account for time-invariant branch or branch-borrower heterogeneity and time-varying census-tract demand shocks.[7]

[4]See Gilje et al. (2016), Cortés and Strahan (2017). Papers also examine how credit segments subject to greater contracting frictions respond to capital shocks.

[5]While it is true that the contracting frictions are higher in counties where banks do not have branches compared to where they do, the information advantage can vary within and across counties where banks have branches depending on the distance of competitors to borrowers.

[6]Brevoort and Hannan (2006) suggests that this is the case for business lending as well.

[7]The dataset draws on the CRA lending data and SOD branch data. CRA refers to the Community Reinvestment Act data on small business lending. SOD refers to the Summary of Deposits data by FDIC which lists bank branch locations.

I start by confirming the existing evidence that fracking and residential booms incentivize capital reallocation and show that business lending is also affected, primarily at small banks: fracking raises lending in outlying markets, while booms lead to lending reductions. This sets the stage for my focus on small banks and the two sets of findings related to lending.[8]

First, using only local loan share and exposure to capital shocks, I show that originations are more sensitive to capital shocks at census tracts of borrowers where the bank provides a *smaller* fraction of the overall credit. In particular, credit increases *more* in lower-share census tracts after a *positive* capital shock. The result is not in line with Gilje et al. (2016) which shows that credit does not increase in no-branch counties, which are likely low-share markets. It implies that the logic from how banks adjust in no-branch counties does not carry over to all markets and emphasizes that lending by competitors may be an important factor. I further find that credit decreases *more* in low-share census tracts following a negative capital shock. This appears to be driven by markets where the branches of both the affected bank and its competitors are close to each other. This result is somewhat at odds with Cortés and Strahan (2017) who find that banks reduce lending in no-branch counties. Instead, I show that reductions occur where all banks have lower shares.

In the second set of findings I control for the loan share, the distance of borrowers to own and competing branches, and further cut the sample into census tracts close/far from competitors. I show that banks use additional capital to expand the share in census tracts that are close to competitors' branches. I also find evidence that lending increases in tracts where competitors are far from the borrower but the affected bank is close. Expanding close to competitors suggests that positive capital shocks allow banks to lend where they are at an informational disadvantage. This is a new result from the perspective of Gilje et al. (2016) which suggests that banks expand only where they have an information advantage. It appears that while banks prefer to expand in counties with own branches, they also focus on markets where the benefit of their local presence is offset by the proximity of competitors.

[8]Bank size is defined based on the number of branches. Small banks have less than 30 branches.

In the case of real estate booms, I find that banks contract primarily in markets where their branches are close to branches of competitors, i.e. where both have similar information advantage. Since these markets are likely more competitive locations with lower contracting frictions, this finding is consistent with conclusion of Cortés and Strahan (2017) that banks cut where they are not able to generate rents. Still, contrary to that paper, I do not find contractions far from own branches, in markets where the bank has no physical presence.

All together, the evidence suggests that positive capital shocks allow banks to overcome the information disadvantage they face when lending close to competitors, besides also helping them lend more where they have superior local information. During contractions banks reduce originations mostly in competitive markets with lower relative return, where they have the same information advantage as their competitors. They maintain lending to borrowers close to their own branches and far from the competition, as well as in the markets far from own branches and close to the competitors.

The results in the literature on local capital shocks highlight the importance of local branches in alleviating contracting frictions with local borrowers. Expansions occur only in counties with branches, since frictions are lower when the bank distance to the borrower is smaller. My evidence further extends these results by showing that local branches can prevent but not fully eliminate lending by competitors, since only banks with lower cost of funding can expand in the proximity. Furthermore, lending close to competitors is valuable since originations in the proximity are not reduced during negative capital shocks. This suggests that maintaining a physical branch close to borrowers can not only reduce the bank's contracting frictions with borrowers but also help limit competition from other lenders.

Having established that capital shocks lead to important changes in the credit supply by individual banks, I evaluate the overall effect of these on total credit supply and real activity. I show that the average census tract exposed to positive supply shocks, experiences and increase in total business lending and business activity (measured by the number of small business establishments). Since the lending results show that banks lend more in tracts where they have an information disadvantage and also where they have better information, I report results based on the local share of affected banks and the level of competition in the census tract. In particular, I examine whether increased credit supply by banks with a small share of local lending can increase total credit and real activity in tracts that are less competitive. This allows me to tests whether the expansion by banks in census tracts where they have an information disadvantage has real effects. The evidence indicates that this is indeed the case. I show that positive credit supply shocks increase the number of establishments in tracts close to the branches of competitors and far from the branches of the expanding bank. I also show that activity increases when affected banks lend more close to their own branches and far from competitors. Finally, the evidence suggests that exposure to banks in residential booms reduces total lending but not overall activity. Activity is only lower in markets with bigger reductions compared to other exposed locations.

Positive shocks allow banks to expand in valuable markets: their own core markets *and* the core markets of competitors, where they lack information advantage. This not only raises total market credit but also increases activity. My results highlight a different aspect of the lending channel – credit supply shocks have real effects in markets where lenders have lower information advantage. Exposure to fracking reduces funding costs, allowing banks to offset their informational disadvantage and compete in markets dominated by competitors. This mechanism is reminiscent of the effect of the de-regulation of banking, which improved bank competition and increased real activity.[9] Finally, I show that negative capital shocks decrease total credit supply but not the number of loans which suggests that businesses are able to substitute credit, likely since this occurs in competitive markets or in areas closer to competitors, where credit alternatives are available.

I show that fracking or residential booms proximity increases small bank liquidity and profitability, driving supply reallocation. One standard deviation increase in fracking exposure raises branch/bank deposits by 4.3%/.6%, between 2000 and 2010. Tract credit increases

[9]See Cetorelli (2001, 2002); Cetorelli and Strahan (2006).

by 9.5%, with branch fixed effects and tract demand controls. One standard deviation higher network fraction where residential appreciation is over the 97^{th} percentile, during 2000 to 2005, increases yield by 7-13bps. Capital is allocated to booms, reducing tract credit by 21%. The profitability and liquidity of big banks appears to be less sensitive to local shocks.

I find that originations are more sensitive in small-share markets both for contraction and expansions. When the tract loan share is 10% below the bank average, the positive/negative supply effects are 50%/23% bigger in magnitude. To further understand the role of proximity to competitors, I divide the sample by borrowers close/far from competitors, including the loan share and distance to borrowers as explanatory variables. For borrowers close to competitors, expansions are 9% higher when the loan market share is 10% blow the average. For borrowers far from competitors, expansions increase with proximity to own branches. In the latter case, originations are 38% higher when the branch and borrower share a tract. With residential booms, banks reduce more when both their own and competitors' branches are close to borrowers: originations are 83% lower. When competitors are relatively far, banks decrease lending at an intermediate distance to other banks with a similar magnitude.

Tract credit and activity evidence is based on exposure to banks with below/above-average market shares. One standard deviation higher fracking exposure to below/above-average-share banks increases credit by 2.6% (in both cases) and small establishments by 1.1%/0.5%. In the middle/bottom HHI markets low-share lenders increases activity by 0.8%/1.2%. In the rest, high-share lenders increase activity by 1%. Exposure to residential booms reduces total credit between 2.6% and 2.9%. The lower credit supply has no real impact in all but the top HHI markets, where activity decreases relative to tracts with exposure to low-share lenders.

Section 2 lists related literature and contributions. Section 3 discusses data sources. Section 4 defines bank exposure and sample selection. Section 5 shows the bank-level incentives for capital reallocation. Section 6 and 7 deal with credit supply and its effect on total credit and real activity. Section 8 includes robustness/extensions and 9 concludes the paper.

2 Related Literature

The paper contributes to the literature on intra-bank capital allocations of local shocks. Bustos et al. (2016) and Gilje et al. (2016) examine the effect of local liquidity shocks. Chakraborty et al. (2018) study the impact of exposure to residential booms, while Berrospide et al. (2016) focus on busts.[10] My key contribution to this literature is with the introductions of measures of competition from other lenders. Most of the existing studies examine the importance of distance-based information frictions by comparing how shocks propagate to counties with/without branches. They suggest that local branches primarily alleviate these lending frictions. My results highlight that branches are important for banks as a way to prevent other lenders from providing credit in the proximity. I recognize that the distance to the borrower does not accurately capture the relative information advantage of lending since the proximity of other lenders will exacerbate the contracting frictions (Dell'Ariccia (2001)). I show that the intuition about where banks allocate credit shocks relative to their own branches does not carry over when one considers the location of other competitors. More specifically, a bank with a positive shock lends more where other lenders are closer and it is at a relative disadvantage. I also provide evidence that this lending expansion increases business activity and does not simply allow businesses to substitute for cheaper credit. My results help identify how the real effect of credit supply shocks differs by the level of competition in the local market. Finally, I contribute to the literature by showing that most of the existing results, which use mortgage lending, hold for the case of business originations.

The paper is related to the literature on the importance of local information in bank lending. A key premise in my empirical results comes from Degryse and Ongena (2005) who show that the distance between the borrower and competing lenders can significantly relax the pricing competition. I also rely on Agarwal and Hauswald (2010) who further show that the share of lending decreases with the borrower distance to competitors. The

[10] For examples of other local shocks see Cortés and Strahan (2017), Bord et al. (2017), Chavaz (2014), and Loutskina and Strahan (2015)

models of Hauswald and Marquez (2006) and Dell'Ariccia (2001) emphasize the variation in information disadvantage and the increase in asymmetric information for borrowers close to competitors. My results suggest that the lower cost of funding helps banks lend in markets where the asymmetric information makes lending more expensive. I also show that banks limit reductions in credit these markets when they have lower capital.

This paper also contributes to the expansive literature on the effect of financial competition on economic growth. This literature uses the branching deregulation legislature and the resulting increase in banking competition across the US to examine its effect on local activity as in Cetorelli and Gambera (2001) and Jayaratne and Strahan (1996). My evidence suggests that local shocks allow banks to compete in concentrated markets with higher frictions, where they previously have not be able to. This mirrors the effect of deregulation. The evidence emphasizes that branch deregulation can have a positive impact on activity when banks have sufficient cost advantage, which allows them to gain market share in high-frictions markets.

3 Data Sources

Credit Data: Credit information comes from the detailed filings required under the Community Reinvestment Act.[11] These include the combined gross originations amounts and count for commercial and industrial loans and loans with values of less than $1 million secured by nonresidential real estate. Banks report total credit for each county by the relative income group of borrowers. Each census tract has an income group and shows if it has originations. This allows me to identify tract originations, if tracts have unique relative county income category.[12] Branch locations come from the FDIC's Summary of Deposits. The paper uses expected originations which combine tract lending and origination probability. I link branch locations to borrowers' tract, assuming that a closer branch is more likely to

[11] This includes of independent commercial banks and savings institutions with more than $250 million in assets or banks owned by a bank-holding company with more than $1 billion in total assets

[12] For tracts with the same income category I distribute the reported credit equally.

originate a loan. I assign tract originations to branches within 25% of the closest-branch distance, using the inverse of the distance to assign the probability. Since this allocation will link originations to all branches if a tract is relatively far from the network, I allocate tracts above the 90^{th} percentile, or those linked to more than five branches, to the bank headquarter. I repeat the algorithm for each lending tract and for each bank. For more information on this allocation, consult the online data appendix. I aggregate originations at the branch and test whether offices outside the shock areas lend differently relative to other branches in the same town, controlling for branch heterogeneity. For the main results, I analyze branch originations at census tracts, comparing them to the amount that other banks originate in the same tract, controlling for branch-tract heterogeneity.

Bank and Real Activity Data: Bank balance sheet data comes from the Call Reports provided by the FDIC and linked to the credit data using the bank certificate number. The balance sheet and income statement variables are as of the last reporting quarter. In order to identify the effect of exposure to local shocks independently from other differences in the bank characteristics, I include a set of balance sheet controls from the Call Reports.

Data on the number of establishments is taken from the County Business Patterns (CBP). CBP is maintained by the US Census and provides detailed information on the annual number of businesses with paid employees as of March 12th. I use the information at the zip-code level and convert it to census tracts based on population weights from the 2000 Census. For each tract I have the number of establishments by size of employment by the two-digit industry code. This allows me to examine how the whole distribution of establishments for each industry is affected by supply shocks in different census tracts.

Fracking and Residential Boom Data: Fracking data comes from the U.S. Geological Survey, which examines the development of drilling with hydraulic fracturing up to 2010 (Gallegos and Varela (2015)). The data has locations of both horizontal and directional wells by the 8-digit hydrologic unit code areas (HUC). The HUCs are comparable to counties in size but do not overlap since they enclose distinct parts of water bodies. The coordinates of each branch help assign it to a HUC and infer the number of drilling wells in the proximity. The existing fracking literature shows that the purchase of the rights to drill provides a significant payments for the owner of the land (Plosser (2014)). I use the the number of new horizontal and directional wells in a given area to capture deposit growth.

Residential appreciation comes from Zillow's real estate index. The index is a quality-adjusted median value of housing for a given zip-code, town/city, and county. I construct bank exposure to booms based on the appreciation of real estate in the branch census-designated places (CDP). CDPs can be town, cities, or parts of counties. I use the average zip-code and city index data, when available, and the county data when missing. Residential appreciation is based on the CDP's index growth rate.

4 Bank Exposure and Sample Selection

This paper differentiates between small banks, with less than 30 branches, and big institutions.[13] The literature has provided theoretical and empirical arguments for the difference in the business model and customers of banks of varying size and geographical scope.[14] Smaller banks can be subject to informational frictions in capital markets, making them more dependent on internal capital sources. Higher liquidity affects total bank capital at these institutions, not just the composition. Banks that can increase capital will not generate cross-branch spillovers due to local shocks.

Definition of Fracking Exposure: New fracking wells can lead to a windfall for the land owner. I assume that each branch in the HUC receives a windfall with a likelihood based on the local deposit share. This implies that the same well increase leads to a lower expected deposit growth for branches with more competition. Bank i's exposure is:

$$Exp_{i,t} = \sum_{b_{j,i,t} \in B_{i,t}} NewWells_{j,t} \times \frac{Dep_{j,i,t}}{TotalDep_{j,t}} \tag{1}$$

[13]This definition roughly corresponds to banks with less than \$1.1 billion in assets.
[14]See Berger et al. (2005) and Berger et al. (2001).

$B_{i,t}$ is a set of all bank branches, $NewWells_{j,t}$ is total new wells in a hydrological unit area, j, $Dep_{j,i,t}$ is total deposits for bank i branches in the HUC.[15] The measure in the main results is further restricted based on the branch-level deposit evidence. In particular, the branch results show that proximity to new wells generates additional deposits only in the South Atlantic, West South Central, and Mountain Census divisions. Therefore, I define bank level exposure only based on branches which experience deposit growth related to fracking. This restricts the sample of affected banks to only those with branches in these areas.[16] The period of the sample is between 2000 and 2010.

Definition of Exposure to Residential Booms: Rising house prices indicate an underlying local productivity shock or amenities-driven higher demand for housing (Moretti (2011)). I measure bank exposure to such conditions by examining which markets allow banks to increase the return on assets and net interest margin, in the run-up to the recession between 2000 and 2005. I compare performance for institutions with varying loan-weighted fraction of branches in markets at different part of the regional appreciation distribution. Results are shown in Table A1 in the online appendix.[17] I find that presence in the top 97^{th} percentile is most strongly associated with higher earning performance, with a weaker but positive relationship down to the 91^{st} percentile. Formally the measure of exposure is:

$$Exp_{i,t} = \sum_{b_{j,i,t} \in B_{i,t}} I(Boom)_{j,i,t} \times \frac{SBL_{j,i,t-1}}{TotalSBL_{i,t}} \tag{2}$$

where each branch of bank i is located in a given CDP j. $I(Boom)_{j,i,t}$ indicates if location j of branch i is in the top 97^{th} percentile of residential appreciation for the region, $SBL_{j,i,t-1}$ is total lagged small business loans in that location by the branch, and $TotalSBL_{i,t}$ is total bank lending. The period of the sample is between 2000 and 2005. In all specifications, I

[15] Bank exposure can be calculated as the total new wells, adjusted for deposit market share, across the entire bank network. I do not use a bank weighted average of branch exposure because new liquidity by assumption will change the relative deposit share in each of the bank markets.

[16] I further limit exposed banks to those with 90^{th} percentile of borrower distance below 60 miles to focus on regional banks.

[17] I test whether a higher fraction of branches in locations in the top 99th percentile is associated with higher yield on earning assets, repeating this for fraction of branches throughout the top decile.

exclude areas that experience residential appreciation in the top 91^{st} percentile.

Table 1 reports summary statistics at the level of banks by the level of exposure. Small banks with and without exposure to fracking differ by total deposits and interest expense. This is consistent with the assumption that proximity to fracking improves liquidity. Comparing small banks based on their presence in the top 97^{th} percentile markets shows that positive exposure is associated with higher yield on earning assets and net interest margin.

5 Bank Incentives for Capital Reallocation

The identification in the paper relies on local, non-systemic factors which provide a bank incentive to reallocate capital and adjust the spatial loan portfolio distribution. The shocks help interpret credit changes in the network, outside the direct impact, as supply driven.

Branches in locations close to fracking wells or residential booms can affect the overall bank balance sheet and income statement. I show that fracking exposure changes total deposits and interest expense. Branch deposit information shows that this is related to new fracking wells in the same hydrological area. Increases in deposits expand bank capital, reduce cost of funds, and allow banks to increase credit, particularly if they have limited capital-raising ability. Residential booms allow banks to lend at a higher interest, increasing the yield on earning assets and net interest margin, through capital reallocation.

Branch deposits data can identify where fracking wells increase liquidity by estimating:

$$Dep_{i,j,t} = \alpha^{Size_i} NewWells_{HUC,t} + \gamma X^i_{t-1} + \phi_{i,j} + \sigma_{metro,t} + \epsilon^i_{b,t} \tag{3}$$

$Dep_{i,j,t}$ is the log of deposits at branch j of bank i. The effect of new wells in the proximity, $NewWells_{HUC,t}$, varies with bank size. Banks with less than 30 offices are designated as small. $\phi_{i,j}$ is a branch fixed effect. $\sigma_{metro,t}$ controls for annual variations in deposit at the metropolitan area. X^i_{t-1} includes bank controls which account for bank-level shocks.[18]

[18]Control variables include the lags of Log of Assets, Deposits/Assets, C&I Loans/Assets, Mortgage

The total bank impact of each shock is estimated with the following model:

$$Y_{i,t} = \alpha^{Size_i} Exp_{i,t} + \gamma X^i_{t-1} + \phi_i + \sigma_{state,t} + \epsilon^i_{i,t} \tag{4}$$

$Y_{i,t}$ is log deposits, deposit cost, yield on assets, or net interest margin. $Exp_{i,t}$ is bank exposure to fracking or residential booms, $\phi_i/\sigma_{state,t}$ are bank/state-year fixed effects. The state-year fixed effect controls for the differential regional shocks by the HQ state. Idiosyncratic errors are clustered by the bank state. The effect of exposure varies by bank size as capital spillovers are more important for capital-constrained banks. Additionally, in the case of liquidity, regional increases in deposits will not have the same effect on national banks as on smaller banks. The profitability of national banks is also not expected to be significantly influenced by regional residential booms. I further examine how results vary by the Census region. This narrows down areas where local exposure affects capital reallocation.

Estimates of models (3) and (4) in Table 2 suggest that proximity to fracking has a significant bank and branch impact. In column (1), one deviation increase in small/big branch exposure of 1.8/4.1 wells raises branch deposits by 4.3%/2.2%, suggesting that land owners may be more likely to use a smaller bank. Column (2) breaks down the effect by the branch region, indicating that small-bank effects are significant only in the South and West regions, while big-bank branches see increases everywhere. Columns (3) and (4) show that the increases in branch deposit aggregate up to the bank level only for smaller regional banks. One deviation increase in exposure (4.3 wells) leads to a 0.6% increase in total deposits and a 3 bps decrease in deposit cost. Fracking exposure and the resulting branch deposits provide a significant increase in liquidity without cost increases. Big banks are not affected, implying that jumps in branch deposit are small in relative terms. I restrict bank exposure in what follows to banks with branches in the South and West regions since only they are significant.

Table 2 also shows that residential booms increase profitability. One deviation increase in exposure of 0.38 in columns (5) and (6), raises the yield on assets and the interest margin

Loans/Assets, Unused Loan Commitments / Assets, and the change in the number of branches.

by close to 5bps. The increase is even bigger – between 7-13bps – when the effect is allowed to vary by region, in columns (7) and (8). The results likely underestimate the increase in profitability because the non-exposure group includes banks with branches in areas in the top decile of appreciations, which also can experience some increase in profitability. Booms impact the relative profitability across all regions except for the Northeast.[19] As a results, I restrict the definition of exposure to booms by excluding this region. Bigger banks are not affected, highlighting that systemic, rather than regional shocks are more important in explaining variation in the profitability of these banks.

6 Credit Supply Shocks

Increases in local deposits and profitability impact capital and expected return for the whole institution. More deposits from fracking raise bank capital available for credit. Increase in interest borrowers in residential booms are willing to pay raises the implicit return to capital for all branches and limits capital at offices outside. When exposure to these shocks is partial, the incentive to reallocate links branches and leads to changes in supply at outlying offices.

Credit supply shocks are identified by comparing originations across banks with varying exposure in outlying markets. For the main results, I use branch originations in borrower's census-tract and compare to lending by other tract lenders, assuming common tract shocks. The baseline credit supply shocks are identified with the following empirical model:

$$Y_{i,j,m,t} = \alpha^s Exp_{i,t} + \beta X_{i,t-1} + \phi_{i,j,m} + \eta_{m,t} + \epsilon_{i,j,m,t} \tag{5}$$

$Y_{i,j,m,t}$ is log of small business lending by branch j of bank i, in tract m. The effect of bank exposure, $Exp_{i,t}$, varies by bank size, and this is made explicit with the index s, for small banks. $\phi_{i,j,m}$ controls for the time-invariant tract differences in originations and rules out

[19] Funding costs and yield increase for banks in the Western region, possibly due to the tougher competition for deposits in booming areas. The increase in yield still provides an important incentive to reallocate capital.

the identification of supply shocks by permanent differences in borrowers. $\eta_{m,t}$ controls for time-varying differences in tract originations. $X_{i,t-1}$ includes bank controls listed above and big bank exposure. I exclude tracts directly affected by the liquidity or profitability shocks.[20]

The identification of supply shocks is based on branch tract originations relative to own long-term levels and other banks in the tract. I will not identify these if borrowers of exposed banks have differential demand shocks. Within the same tract, borrowers face the same local factors and common credit variations, accounted with tract-year FE, capture local demand shifts. Results from model (5) with $Exp_{i,t-1}$ and $Exp_{i,t}$, show that only $Exp_{i,t-1}$ matters for fracking and only $Exp_{i,t}$ is significant for booms. I, therefore, use lagged fracking exposure and current booms exposure below. The lending increase that follows higher liquidity rules out timing inconsistencies. No delay in the case of residential booms suggests that banks take advantage of current shocks that improve profitability in these areas.

Spatial competition implicitly constrains where banks will allocate capital. The small business lending literature argues that transportation costs or strategic acquisition of soft information shapes local competition and affects the loan distribution. Information accuracy declines with distance, allowing banks to originate a bigger share closer to their branches and a smaller share closer to competitors. The latter markets are more contested since the bank is constrained by lower information quality and a minimum loan term it can offer. I first examine the importance of market share as a proxy of the effects of local competition:

$$Y_{i,j,m,t} = \alpha^s Exp_{i,t} + \gamma^s Exp_{i,t} Sh_{i,j,m,t-1} + \sigma^s Sh_{i,j,m,t-1} + \beta X_{i,t-1} + \phi_{i,j,m} + \eta_{m,t} + \epsilon_{i,j,m,t} \quad (6)$$

$Sh_{i,j,m,t-1}$ is lagged loan share of branch j of bank i in tract m. I center the share at the bank average which implies that α^s represents the average supply effect. Positive share captures supply shocks at above-average-share markets and negative share captures those below.

The market share reflects factors of spatial competition as well as the marginal return to capital, bank specialization, first-mover advantage, among others. To account for these

[20]In the case of residential booms I exclude areas within the 91^{th} percentile of appreciation.

independently of local spatial competition, I add distance to own branches and competitors:

$$\begin{aligned} Y_{i,j,m,t} = \alpha_1^s Exp_{i,t} + \gamma_1^s Exp_{i,t} Sh_{i,j,m,t-1} + \gamma_2^s Exp_{i,t} RemCom_{i,j,m} + \gamma_3^s Exp_{i,t} ClLend_{i,j,m} \\ + \sigma_1^s Sh_{i,j,m,t-1} + \beta_1 X_{i,t-1} + \phi_{i,j,m} + \eta_{m,t} + \epsilon_{i,j,m,t} \end{aligned} \tag{7}$$

$RemCom_{i,j,m}$ is the remoteness to competitors: 1-(1/(1+DistanceToCompetitors)) and $ClLend_{i,j,m}$ is closeness to lender: (1/(1+BorrowerDistance)).[21] Increases in each represent more favorable position for the lender due to the relative information advantage and an implicit higher share. When both measures are at zero, borrowers are close to competitors and far from the originating branch. At 1 borrowers are close to the originator and far from competitors. I further estimate the model after splitting the sample into markets close/far from competitors based on a cutoff value for $RemCom_{i,j,m}$.[22] This helps to identify supply changes in competitive markets, which are both close to competitors and the originating branch, and in contested ones, which are close to competitors but far from the originating branch.

γ_2^s, and γ_3^s are coefficients of interest in this specification. Positive estimates suggest that originations are higher when exposed banks enjoy an information advantage. With negative estimates, originations are higher in markets where banks face more competition and soft information about borrowers is less accurate. In the context of positive supply shocks, negative estimates imply that banks expand in more contested markets, while positive estimates indicate higher originations in their own core markets.

The baseline estimates in Table 3 show significant supply changes due to fracking and residential boom exposure, which go in the opposite direction and depend on the level of competition in the market. In columns (1), tract originations increase by 9.3%, for one standard deviation increase in bank exposure, equal to 4.3. Estimates from models (6) and (7) show that the supply effect decreases with the existing market share and increases

[21] *BorrowerDistance* is distance from the branch to the boundary of the borrower tract. *DistanceToCompetitors* is average distance of the rest of the lenders in the tract, excluding the 15% most distant lenders.

[22] For the fracking sample, markets below 0.9 for $RemCom_{i,j,m}$ are *Close*; for the booms sample, those below 0.8 are *Close*. I use two different values because the distribution of $RemCom_{i,j,m}$ in the case of fracking and booms is slightly different.

with the distance to competitors. In column (2), 10% below-average market share raises lending by 50% or 15.4% in total. Conversely, markets where banks enjoy higher market share experience smaller supply shocks. Column (3) shows that expansions are higher close to competitors: at 0.8 competitor remoteness, the supply effect is double the baseline and increases closer to competitors. In column (4), I include both the share and distance and find that only share is significant, with a similar magnitude as in column (2). This indicates that the share captures information factors proxied by distance. Lending increases more in markets with lower share because these are generally close to competitors. In column (5), I focus on the sample of markets close to competitors. Since competitors in this sample are close, the distance of the originating bank tells us if the market is competitive or is the core market of a competitor, where the originating bank lacks an information advantage. I find that the magnitude of the effect of share is even bigger, while distance is not important. The effect of exposure, at 10% below the average market share, is 55% higher, compared to the same effect for the whole sample. The fact that closeness of the lender is not significant indicates that originations increase both when the bank is located in the same market and when it is farther away. In other words, expansions occur in small-share markets both in the core markets of competitors and in competitive markets. In column (6), which uses the sample of markets far from competitors, closeness to lender is positive and is the only significant coefficient. Expansions occur mostly close to the affected banks, where they have a higher information advantage. The magnitude of the supply effect is much higher in the banks's core markets, compared to the expansion in small-share markets. In the core markets, the effect of exposure is 0.09 when the originating branch is in the same tract as the borrower and in the competitor's core or competitive markets it is 0.02 at 10% below average market share. The results suggest that positive capital shocks are not only allocated to the bank's core markets. They also help expand market share in competitors' core markets, where the improved financial position allows the bank to overcome its information disadvantage, as well as in more competitive areas.

The results in Table 3 for residential booms show that there are substantial credit reductions in outlying tracts. One standard deviation increase in exposure, equal to 0.38, leads to 21% lower originations. A small difference in the yield seems sufficient to induce a relatively substantial reallocation of capital. Allowing for variation in market share in column (8), shows that credit reductions are bigger below the average market share: lending decreases an additional 23% in markets with 10% below-average share, or 26% in total. When only distance measures are included in column (9), credit reductions are strongest in markets closest to competitors. When both share and distance are included in column (10), both preserve their magnitude but the effect of the share is still significant, while remoteness of competitors is marginally significant. As in the case of fracking, the effect of share reflects factors of information advantage and the effect of distance is not significant once the share is included. The estimates from the full sample suggest that reductions are strongest with small market shares, close to competitors. The sample of markets close to competitors in column (11) shows that banks reduce more when borrowers are close to both their own and competitor branches. With borrowers in the same tract, lending decreases by 83% at median exposure of 0.9. Originations decrease primarily in competitive markets and not core markets of competitors, as with fracking. If competitors are close and originating branches are at maximum distance, lending does not change. The sample of markets far from competitors in column (12) indicates that banks decrease lending regardless of the share but this is still done when borrowers are relatively closer to competitors. This shows that banks avoid changing originations in their own core markets and adjust at intermediate distance to the competition. This explains why in the full sample credit decreases in small-share markets: these are either competitive ones or away from own or competitors' core markets.

The allocation of capital, which incentivizes banks to both decrease and increase supply across their network, reveals how valuable markets with different share and information advantage are. Higher capital is used to expand market share in their own core markets and the core markets of competitors, where other local lenders enjoy an information advantage.

The share in these markets is important for banks. This is supported not only by the fact that they expand their share when they have more capital but also by the fact that the markets are sheltered during decreases in capital. Both increases and decreases in capital lead to changes in the supply in the competitive markets. Since returns in these markets are likely low, it is not surprising that capital reductions lead to credit contractions in these markets. The fact that lending also increases there after increases in capital suggests that banks have some other advantage or that capital increases exceed the amount of profitable projects in the core and contested markets.

The pattern of capital allocation also shows that credit supply shocks are asymmetric. Higher capital increases supply in markets where banks can gain market share at the expense of a competitor, in the competitor's core market. Lower capital does not change credit in these contested markets. This highlights that the allocation of capital shocks is motivated by incentives of competition and can insulate some markets from negative supply shocks. This is also the case for the bank's own core markets, which experience increased supply when capital increases but remain unaffected during capital decreases. The evidence shows that low-share markets are generally more sensitive to bank capital shocks. Importantly, the affected small-share markets during positive and negative capital shocks are not the same. Expansions in lending occur in competitive and contested markets; during contractions lending decreases mostly in competitive markets. In the extensions section, I show that the observed credit variations cannot be explained by the bank's incentive to geographically diversify the distribution of its portfolio. I also show that originations at the branch level closely follow those at the level of the tract.

7 Tract Credit and Real Activity

The evidence so far shows that capital allocation depends on the existing market share. Positive supply shocks are more significant at below-average-share markets. As a result, a tract with exposed banks may be affected less if these have a higher share, or more with low-share banks. Furthermore, higher share banks are more important for concentrated markets, where they are more likely to expand if competitors are relatively far. I identify the supply effects on tract credit and activity by separating exposure to small banks according to their share. In the robustness, I also examine the role of changes in local competition.[23]

This section compares outcomes at different census tracts. To highlight any structural differences between tracts based on exposure to supply shocks, Table 4 reports summary statistics about lending competition and industrial structure. Tracts exposed to both shocks tend to be slightly more competitive and have higher originations, particularly in the case of residential booms. The comparison makes it clear that the empirical model needs to control for tract heterogeneity and exclude those directly impacted by booms or fracking.

Total Market Credit: The empirical model of total tract lending allows for different effect of exposure for banks with above- and below-average loan shares. I distinguish between total lending by bank size and examine how it is affected by tract exposure to each bank size. I estimate the following model, excluding tracts with direct fracking or booms impact:

$$\begin{aligned} Y_{m,b,t} = \alpha^b \, TractExp^L_{m,b,t} + \beta^b \, TractExp^H_{m,b,t} + \gamma^b \, TractExp^L_{m,b,t} \, TractExp^H_{m,b,t} \\ + \phi_{m,b} + \eta_{county,b,t} + \epsilon_{m,b,t} \end{aligned} \tag{8}$$

$Y_{m,b,t}$ is log lending/total loans in tract m by all banks of size b. $TractExp^L_{m,b,t}/\,TractExp^H_{m,b,t}$ is the tract average of bank exposure for blow-/above-average share institutions, weighted by each bank's loan share. $\phi_{m,b}$ is a tract-bank-size fixed effect and controls for permanent tract differences in total credit by small or big banks. $\eta_{county,b,t}$ is a county-bank-size by year effect, allowing for county annual shocks for each bank size. The effects of tract exposure varies by bank size b and I focus on the estimates for small banks, indexed by s. I allow for an interaction effect between low- and high-share exposure because the individual lending

[23] Decreases in concentration, holding tract exposure constant, indicate credit expansion by a set of small-share banks. The bigger the set of expanding, low-share banks, the more concentration will decrease.

estimates show that banks expand in their core markets and in other banks' core markets. The interaction term captures how total lending responds when this occurs in the same tract. α^s, β^s, and γ^s can also vary depending on how competitive a census tract is. I divide the HHI distribution into top, middle, and bottom, based on the the 33^{rd} and 66^{th} percentiles.

In the case of fracking, both total lending and number of loans increase with tract exposure, and the importance of market share changes with concentration. Column (1) of Table 5 indicates that exposure to banks with blow- and above-average market share increases credit by 2.6% in each case, for one standard deviation increase. Column (2) shows that the loan count at the average tract is not affected by either. Columns (3) and (4) examine differences by market concentration. Total credit in the top/middle HHI markets increases with the presence of both low- and high-share banks, as evidenced by the significant positive effect of the interaction term. The fact that the high-share effect is marginally significant by itself also suggests that tract credit increases more with above-average-share bank exposure. One standard deviation increase in the interaction term of 0.46 increases credit in the top HHI markets by 67% and raises credit by 14% in the middle HHI markets. In the bottom HHI markets, exposure to small-share banks leads to higher credit: one standard deviation leads to 5.4% more credit. Column (4) shows that the loan count increases in a similar fashion with lower magnitude in more competitive markets, indicating higher average loan size.

How consistent are these results with the individual bank reallocation? Banks expand in low-share tracts where they have lower information advantage, or in higher-share markets if these are closer to own branches and far from competitors. The average results show that credit increases with exposure to each. In more concentrated markets, credit does not change only with exposure to high-share banks. Instead, having both low and high-share banks leads to higher lending. This is consistent with the branch results and suggests that tracts part of the core market of an exposed bank see increased originations when a small-share exposed bank tries to expand its share, using its improved financial position to overcame its information disadvantage. In the absence of a small-share lender or in the case when the tract is exposed only to a small-share lender, credit does not change. In the first case, the high-share lender is not challenged and in the second, the small-share lender likely poaches clients from the incumbent. The results suggest that significant tract credit increases occur when an incumbent, with improved liquidity, strategically increases originations to maintain market share as a low-share bank contests the market. Higher small-share exposure in competitive markets indicates that there is a bigger set of exposed lenders which are close to competitors, leading to higher tract credit.

The results in the case of residential booms show that credit deteriorates with tract exposure. In more concentrated markets, this follows exposure to high-share lenders, while in more competitive ones it is due to low-share lenders. Column (5) indicates that total credit decreases with exposure to both lender types: one standard deviation increase in exposure of 0.06/0.028 decreases credit by 2.9%/2.6% due to low-/high-share exposure. The average loan count is not affected in column (6), suggesting that the deterioration in credit results in smaller loan size. Column (7) separates the effect of exposure by market concentration. The reductions in credit in the top HHI markets (3.7%) are due to high-share lenders, while those in competitive ones result from exposure to low-share lenders (4.2%). In the mid-HHI markets, both lead to decreases in tract credit: one standard deviation increase in exposure to low-/high-share lenders decreases credit by 2.5%/3.5%. Column (8) shows that the loan count is not affect, suggesting that credit contractions are driven by lower credit lines.

Individual banks contract in competitive and in more concentrated markets where competitors are closer. In the former, this occurs where banks have smaller shares, while in the latter the share is not important. The tract-level results are in line with this pattern since competitive markets experience biggest contractions. Contractions are also relatively substantial in concentrated markets and are driven by high-share banks. Total number of loans is not affected, indicating that businesses are not receiving less loans but smaller amounts. Compared to fracking, there is no evidence that credit is affected only when both small- and high-share lenders are exposed. This implies that contractions are not strategic and primarily entail the scaling back of lending amounts and not completely eliminating lending to clients. The evidence cannot rule out that businesses are not substituting credit across banks albeit with a reduced overall credit amounts.

The results emphasize that expansions by small-share lenders improve overall credit conditions when a bigger set of exposed banks lend in concentrated markets. The estimates related to contractions highlight that small-share lenders generate more pronounced credit reductions in competitive markets and high-share lenders mostly impact concentrated markets. In each case only the amount of the average credit line is affected, suggesting that local lenders continue to lend to the same number of businesses.

Real Activity: I examine the effect on real activity using the number of business establishments by two-digit industry code in each tract from the County Business Patterns. Since lending by small banks is unlikely to affect bigger businesses, I focus on those with less than 50 employees and designate them as small establishments. I estimate the following model excluding tracts with direct impact from fracking or booms:

$$\begin{aligned} Y_{ind,e,m,t} = {} & \alpha^e\, TractExp^{S,L}_{m,t} + \beta^e\, TractExp^{S,H}_{m,t} + \gamma^e\, TractExp^{S,L}_{m,t}\, TractExp^{S,H}_{m,t} \\ & + \sum_{ind} \sigma^{ind} EstShare_{ind,e,m,t} + \phi_{ind,e,m} + \eta_{county,t} + \epsilon_{ind,e,m,t} \end{aligned} \tag{9}$$

$Y_{ind,e,m,t}$ is log of total establishments in a tract m of industry ind and size e (relative to 50 employees). The establishments count is as of the end of year t.[24] $TractExp^{S,L}_{m,t}$ and $TractExp^{S,H}_{m,t}$ are tract exposure to small banks with below-/above-average market shares. $\phi_{ind,e,m}$ controls for permanent tract differences in the number of establishments, by size and industry. $EstShare_{ind,e,m,t}$ is the share of establishment of industry ind, size e, in tract m. The set of industry shares controls for the growth potential for each industry. I estimate a variation of this model by replacing $TractExp^{S,L}_{m,t}/\,TractExp^{S,H}_{m,t}$ with interactions of each with *I(Far Compete)* and *I(Close Compete)*, which represent average tract exposure

[24]The Census reports establishment count as of the end of the first quarter each year. I have assigned to $Y_{k,m,t}$ the number of establishments as of $t+1$ which is assumed to represent the end-fo-t numbers.

to small-share lenders in markets far/close to other competitors.[25] This allows to further investigate if activity is more sensitive when small-share lenders expand in markets close to competitors. In all cases, the exposure effects vary by establishment size and I report those for small businesses.

In the case of fracking, Table 6 shows that small businesses are positively impacted by credit supply expansions by both small- and high-share lenders. According to column (1), one standard deviation increase in small-/high-share exposure of 0.92/1.04 leads to 1.1%/0.5% increase in small establishments. The negative interaction term suggests that the effects of exposure are higher when a tract has only small- or high-share exposed lenders and implies that when both are present firms may substitute credit. Columns (2) shows that expansions by high-share lenders increase real activity in the top HHI markets: one standard deviation increase leads to 1% increase in small establishments. The effect of small-share lenders in these markets is positive but only marginally significant. Small-share lenders have a significant impact on activity in the middle/bottom HHI markets: one standard deviation increase leads to 0.8%/1.2% increase in establishments. In column (3), I further examine if small-share lenders affect activity in markets close or far from competitors, for the mid HHI markets.[26] They increase activity in concentrated markets where borrowers are close to other competitors by 1.2% – as much as in competitive markets.

The evidence suggests that real activity is positively affected by supply shocks. Tract results are consistent with the individual allocation of bank capital. We see that activity increases in the top HHI markets with exposure to high-share lenders and marginally so to small-share ones. Bank evidence shows that high-share lenders in these markets expand in markets close to own branches. Tract evidence shows that this increase is related to the presence of exposed small-share lenders which contest markets where they lack information advantage. Together, the results suggest that in top HHI markets, total credit increases when

[25] I use 0.90 as a cutoff for the index of distance to competitors to define far and close.

[26] In the rest of the markets the interaction of market share and market concentration suggests that the high-share impact is in markets far from competitors and low-share one is close to competitors. I also estimate but do not report the full model and confirm that this is the case.

a bigger set of local banks are exposed but real activity is primarily affected by the expansion by high-share lenders. A similar outcome occurs in the mid HHI markets in terms of total credit. In this case, low-share lenders have a bigger impact on real activity by successfully challenging incumbents and expanding close to competitors. In competitive markets, both credit and activity is driven by exposure to small-share lenders.

The evidence in the case of residential booms in Table 6, indicates that credit reductions have a limited impact on real activity. The effect of average exposure in column (4) has a positive sign, implying that tracts experience an increase in activity during the reduction in total credit. When coefficients are allowed to vary by the HHI level, the effect of small-share exposure is positive and significant in the top/mid HHI markets, while this is the case for high-share exposure in the bottom HHI markets.

The results from individual bank responses and tract credit show that bigger-share lenders reduce credit more significantly in concentrated markets. One way to interpret the results here is to compare the change in activity across tracts with more small-share exposed lenders to tracts with more high-share exposed lenders. Since the former do not reduce credit significantly we can use them to quantify the relative impact on activity. This assumes that tracts which are not exposed at all are qualitatively different. By this measure, tracts, in concentrated markets, exposed to bigger decreases in credit by big-share lenders grow slower. Instead, when comparing to other, unexposed tract, reductions in credit do not affect real activity. This suggests that businesses find alternative sources of credit. It is also likely, and supported by the evidence, that banks just reduce credit lines but still lend to new businesses.

8 Robustness and Extensions

Geographic Portfolio Diversification

The reallocation of capital that follows bank exposure to each shock can be due to the bank incentive to geographically diversify the distribution of small business loans. This is an alternative interpretation of the results in the main section which deemphasizes the importance of relative local return. According to this hypothesis banks expand or contract credit in order to improve their geographic footprint and minimize exposure to local economic shocks. I explore this by calculating the GINI coefficient for the geographic distribution of the lending portfolio and examine whether it decreases after exposure to each shock. The results are listed in Table 7. The effect of exposure is only significant for banks with relatively diversified lending and implies that banks become less diversified after expansions due to fracking (column 1). In the case of booms, the effect of exposure is positive and significant only for more geographically concentrated lenders. It implies that such banks become even less diversified after their reductions in credit. Both results suggest that exposed banks do not reallocate capital in order to diversify geographically. In both cases banks are less diversified after the capital shocks. This shows that geographic concentration and reallocations based on relative return are not consistent with each other.

Branch vs Branch-tract lending

The main results are based on lending at the level of the tract of the borrower. In this part, I aggregate all originations by each distinct branch and examine the effect of bank exposure on total branch lending. Instead of a branch-tract by year fixed effect I control for town by year effects based on the town of each branch. Comparison between estimates at the level of the branch and the branch-tract help identify the extent to which branches of exposed banks tend to lend in different tracts compared to unexposed ones. The results are listed in Table 7. Column (2) is the main supply effect at the branch level and column (3) is the effect from the main results in the case of fracking. The estimates suggest that exposed banks tend to lend in tracts with permanently higher originations. Comparing columns (7) and (8), in the case of residential booms, we see that estimates are close and there is no evidence of such permanent differences in tract originations.

Market Share and Industrial Composition

The main results show that lending at low-share markets is more sensitive to bank capital shocks. In this section, I investigate which industries are more likely to be affected by this sensitivity. I extend the baseline tract-branch lending model by interacting the effect of market share with the tract share of industries for establishments with less than 50 employees.

The results are listed in Table 7.[27] In the case of fracking, banks expand in small-share tracts when they have above-average concentration in manufacturing. The share appears to matter less for tract with higher share of administrative and support services. The higher share of manufacturing implies that further expansion by small-share lenders can increase profitability and helps support the interpretation that banks expand in markets with higher return. It also suggests that manufacturing establishments are more likely to be impacted by the credit supply shocks. In the case of residential booms, we see that banks contract more in low-share markets with higher concentration of construction, wholesale, retail, and health care. Banks reduce credit in markets outside of booms in order to increase originations within booming areas where residential prices are appreciating and construction is profitable. The fact that they reduce more in tracts with higher share in construction suggest that they minimize their exposure to construction industries outside of the booming markets.

Supply Shocks and Changes in Competition

An alternative approach for identifying where different-share lenders expand or contract credit keeps track of average exposure and changes in concentration. Decreases in concen-

[27] I interact the shares of all industries over 3% but do not report the estimates for non-significant ones

tration, holding tract exposure constant, indicate credit expansion by a set of small-share banks. Conversely, the bigger the set of expanding, low-share banks, the more concentration will decrease. I compute average tract exposure and use changes in the HHI after tract exposure. In the case of total credit, I estimate the following model in several versions:

$$\begin{aligned} Y_{m,b,t} = \alpha^b \, TractExp_{m,b,t} + \beta^b \, TractExp_{m,b,t} \triangle InvHHI_{m,t} \\ + \gamma^b \triangle InvHHI_{m,t} + \phi_{m,b} + \eta_{county,b,t} + \epsilon_{m,b,t} \end{aligned} \tag{10}$$

$Y_{m,b,t}$ is log lending/total loans in tract m by all banks of size b. $TractExp_{m,b,t}$ is the tract m loan-share weighted average of bank exposure. $\triangle InvHHI_{m,t}$ is the change in the inverse HHI at tract m, where a value of 1 stands for a perfectly competitive market. Positive $\triangle InvHHI_{m,t}$ indicates an increase in competition. α^s, β^s, and γ^s can vary HHI. When interacted with the HHI category, β^s captures the impact of change in competition which moves the tract's concentration to the bottom, middle, or top of the HHI distribution. It identifies supply shocks in tracts where competitors are not able to maintain share.

I estimate the effect on real activity allowing for supply-driven changes in concentration:

$$\begin{aligned} Y_{ind,e,m,t} = \alpha^e \, TractExp^s_{m,t} + \beta^e \, TractExp^s_{m,t} \triangle InvHHI_{m,t} \\ + \gamma^e \triangle InvHHI_{m,t} + \phi_{ind,e,m} + \eta_{county,t} + \epsilon_{ind,e,m,t} \end{aligned} \tag{11}$$

$Y_{ind,e,m,t}$ is log of total establishments in a tract m of industry ind and size e. Variables are defined as in the credit model. The variation in number of establishments of different size by industry for each tract allows me to replace the county-level shocks with tract-year fixed effects. In this case, I cannot estimate separate effects for small/big establishments but can identify if smaller ones change relative to big ones. The benefit of this approach is that the tract-year fixed effect controls for common shocks at the tract level such as variations in the tract concentration, which can results from tract-level demand shocks.

Tract Credit: With fracking, Table 8 shows that both total lending and number of loans increase with exposure. One deviation increase of 2.2 wells raises total small-bank credit/count by 6%/1.7%. The effect of change in concentration is not significant in either case. Lending increases in competitive markets: 8.3% more credit for one deviation increase in exposure, independent of concentration change. Decrease in concentration explains increases in number of loans: one deviation higher competition of 5% increases loan count by 2.6% with 2.2 wells exposure. This shows that the credit increase in concentrated markets from the main results is not driven by changes in concentration. It implies that both types of lenders need to be present in order to see increases in tract credit. This further confirms that improvement of credit results from small-share lenders contesting markets where big-share lenders also experience increased liquidity.

Credit deteriorates with tract exposure to residential booms. Column (5) indicates one deviation increase in exposure of 0.10 decreases lending by 5.7% and 5% increase in competition decreases lending by 11%. Total loans in column (6), are negatively affected only with increases in competition. For top HHI markets, higher competition leads to decreases in credit and number of loans. A 5% higher competition there decreases total credit/loan count by 16%/6.4%. This suggests that the decrease in credit due to contraction by big-share lenders in the main results can be partially attributed to reductions in concentration. There are no interactions between exposure by banks of different share, as with fracking.

Real Activity: Table 6 shows that small businesses are positively impacted by credit supply expansions. In column (1), one deviation increase in exposure of 2.2 wells leads to 1.8% increase in small establishments. Concentration is not significant in the baseline case. When coefficients vary HHI, the effect is significant for tracts with lower concentration, both with a county/tract-level demand controls. A 5% reduction in concentration leads to a 0.3%/0.4% increase in small establishments. The positive effect is in addition of that of average exposure. Column (2) shows that exposure has a positive effect in all markets, while in column (3) it is significant in concentrated ones. Relative to the main results, the evidence here shows that increases in activity in concentrated markets do not occur with changes in concentration. Instead, both small- and big-share lenders increase credit, preserving their shares. At the same time, increases by big-share lenders drive activity in the top HHI markets, while small-share lenders are critical for activity in the mid/bottom HHI markets.

The evidence in the case of residential booms indicates that credit reductions have a limited impact on real activity. The effect of average exposure in column (4) has a positive sign, implying that tracts experience an increase in activity during the reduction in total credit. When coefficients vary with the HHI level, the effect of exposure is only marginally significant and positive. In more competitive markets, the effect of change in concentration is positive and significant. It implies that reductions in real activity occur only in cases when competition is reduced. This is consistent with the main results, which showed that, in competitive markets, activity is lower with higher exposure to small-share lenders compared to exposure to high-share ones. The estimates here suggest that the exist of small-share lenders reduces competition and can decrease activity.

9 Conclusion

This paper uses two of the well-documented local shocks, studied by this literature, and shows that the existing evidence regarding credit effects holds in the case of small business lending. I go beyond the average effect, documented in the existing studies, and show that banks reallocate capital in a strategic fashion. Credit is expanded by banks that overcome lower quality of information at distance, taking advantage of higher liquidity/lower deposit expense. They target low-share markets with higher marginal return to capital. Contractions occur in reverse – banks reduce where a higher share results in lower marginal return, and where information quality is lower. This emphasizes the interaction between the bank's ability to acquire soft information at a distance and its financial position. I show that supply shocks have asymmetric effects on activity due to the strategic fashion of capital allocation. Positive shocks not only increase supply across the network but also raise total market credit and activity. The results highlight a different aspect of the lending channel – credit supply shocks have real effects in markets where lenders have lower historic loan shares and use their improved financial position to offset lower market power.

Tables and Figures

Table 1: Summary Statistics for Banks by Exposure

	Fracking Wells					Residential Booms				
	Small Banks		Big Banks		All	Small Banks		Big Banks		All
	$Exp_{i,t}$=0	$Exp_{i,t} > 0$	$Exp_{i,t}$=0	$Exp_{i,t} > 0$		$Exp_{i,t}$=0	$Exp_{i,t} > 0$	$Exp_{i,t}$=0	$Exp_{i,t} > 0$	
$Exp_{i,t}$	0	1.214	0	7.366	0.451	0	0.491	0	0.144	0.0747
	(0)	(4.362)	(0)	(23.36)	(5.647)	(0)	(0.380)	(0)	(0.208)	(0.219)
Log Deposits	12.98	13.09	15.02	15.64	13.44	12.93	13.19	14.74	15.60	13.42
	(0.931)	(0.906)	(1.060)	(1.613)	(1.337)	(0.912)	(0.778)	(0.936)	(1.348)	(1.320)
Interest Expense (%)	3.241	2.759	3.117	3.210	3.191	7.297	5.071	3.495	3.570	6.248
	(1.811)	(1.481)	(1.937)	(2.319)	(1.847)	(144.1)	(54.07)	(2.668)	(2.201)	(119.6)
Yield on Assets (%)	6.582	6.605	6.165	6.099	6.494	6.666	6.758	6.446	6.374	6.624
	(1.650)	(1.403)	(1.332)	(1.336)	(1.586)	(1.514)	(1.644)	(1.231)	(1.277)	(1.485)
Net Interest Margin (%)	3.966	4.240	3.812	3.811	3.950	4.032	4.110	3.874	3.804	4.002
	(1.276)	(0.980)	(0.838)	(0.803)	(1.185)	(1.178)	(1.321)	(0.845)	(0.836)	(1.139)
Log Assets	13.16	13.21	15.24	15.91	13.62	13.13	13.38	14.95	15.86	13.63
	(0.987)	(0.948)	(1.166)	(1.768)	(1.407)	(0.927)	(0.844)	(1.073)	(1.479)	(1.368)
Deposits over Assets	0.788	0.823	0.744	0.731	0.780	0.787	0.775	0.745	0.721	0.774
	(0.105)	(0.0928)	(0.104)	(0.107)	(0.107)	(0.120)	(0.110)	(0.113)	(0.106)	(0.119)
Capital over Assets (%)	9.837	9.199	9.482	9.613	9.733	9.647	9.447	9.158	9.077	9.513
	(4.144)	(2.958)	(2.615)	(2.733)	(3.823)	(3.704)	(4.073)	(2.328)	(2.411)	(3.527)
Securities over Assets	0.224	0.251	0.209	0.200	0.222	0.233	0.227	0.228	0.208	0.230
	(0.138)	(0.167)	(0.110)	(0.105)	(0.135)	(0.147)	(0.131)	(0.114)	(0.105)	(0.139)
Mortgages over Assets	0.346	0.302	0.374	0.323	0.346	0.345	0.357	0.377	0.374	0.353
	(0.186)	(0.189)	(0.180)	(0.163)	(0.185)	(0.189)	(0.181)	(0.187)	(0.178)	(0.187)
Business Loans over Assets	0.322	0.340	0.308	0.340	0.322	0.318	0.320	0.298	0.297	0.314
	(0.175)	(0.195)	(0.149)	(0.148)	(0.172)	(0.180)	(0.161)	(0.143)	(0.143)	(0.171)
Net Operating Income over Assets (%)	1.010	1.169	0.932	0.966	1.005	1.177	1.134	1.155	1.179	1.170
	(1.136)	(0.817)	(1.080)	(1.118)	(1.111)	(1.020)	(0.649)	(0.600)	(0.563)	(0.905)
Unused Commitments over Assets	0.245	0.142	0.214	0.215	0.232	0.219	0.242	0.204	0.238	0.222
	(2.083)	(0.133)	(0.226)	(0.141)	(1.788)	(1.122)	(1.300)	(0.206)	(0.235)	(1.030)
Part of Holding Company	0.369	0.419	0.433	0.538	0.391	0.399	0.322	0.423	0.545	0.407
	(0.483)	(0.494)	(0.496)	(0.499)	(0.488)	(0.490)	(0.467)	(0.494)	(0.498)	(0.491)
Single Bank Entity	0.412	0.462	0.399	0.342	0.409	0.391	0.437	0.395	0.291	0.387
	(0.492)	(0.499)	(0.490)	(0.475)	(0.492)	(0.488)	(0.496)	(0.489)	(0.455)	(0.487)

Notes: The table reports average values and standard deviations for balance sheet and income variables of banks divided by their exposure to fracking or residential booms and their size. Small banks have less than 30 branches.

Table 2: Deposit and Profitability Impact of Local Exposure

	Exposure: Fracking Wells				*Exposure*: Residential Booms			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Branch Deposits	Branch Deposits	Bank Deposits	Interest Expense	Yield on Assets	Net Interest Margin	Yield on Assets	Net Interest Margin
Exp^S	0.0240***		0.00138**	-0.00591***	0.113***	0.0956***		
	(0.00801)		(0.000515)	(0.00155)	(0.0367)	(0.0323)		
Exp^S *Northeast Region*		0.000312					0.00978	-0.0225
		(0.00903)					(0.0525)	(0.0323)
Exp^S *Midwest Region*		0.247					0.176***	0.162**
		(0.208)					(0.0482)	(0.0637)
Exp^S *South Region*		0.0271***					0.0645*	0.131***
		(0.00950)					(0.0334)	(0.0270)
Exp^S *West Region*		0.0244**					0.327**	0.0492
		(0.0119)					(0.141)	(0.0815)
Exp^B	0.00542**		0.000160*	0.00124	-0.116	-0.207		
	(0.00273)		(9.16e-05)	(0.00226)	(0.347)	(0.310)		
Exp^B *Northeast Region*		0.0525***					-0.510	-0.660**
		(0.0188)					(0.350)	(0.295)
Exp^B *Midwest Region*		0.00101***					-1.402**	-1.210**
		(0.000226)					(0.610)	(0.500)
Exp^B *South Region*		0.0106***					0.223	0.248
		(0.00169)					(0.224)	(0.183)
Exp^B *West Region*		0.0147**					1.393	0.517
		(0.00583)					(0.936)	(0.708)
Observations	554,714	554,714	14,729	14,416	5,874	5,874	5,874	5,874
R-squared	0.935	0.935	0.985	0.883	0.921	0.902	0.922	0.902
Branch FE	Yes	Yes						
Metro x Year FE	Yes	Yes						
Bank FE			Yes	Yes	Yes	Yes	Yes	Yes
State x Year FE			Yes	Yes	Yes	Yes	Yes	Yes
Cluster	Branch	Branch	Bank, State	Bank, State	Bank, State	Bank, State	Bank, State	Bank, State

Notes: *** p<0.01, ** p<0.05, * p<0.1. Column (1) and (2) are based on branch-level regressions using branch deposits. Exp^S/Exp^B in this case is the weighted total of new fracking wells in the proximity. Columns (3)-(8) are based on bank-level regressions. Exp^S/Exp^B in this case is the bank-level exposure to each local shock: total new wells or fraction of branches in residential booms. Northeast/Midwest/South/West are indicators for each of the four Census regions. Interest expense is total cost of funding assets divided by all deposits. Fracking sample covers the period from 2000 to 2010. Residential booms sample covers the period from 2000 to 2005. Interest expense, yield on assets and net interest margin are in %. Controls included in the estimation but not reported include: ln Assets_{t-1}, $\text{Deposits/Assets}_{t-1}$, $\text{Securities/Assets}_{t-1}$, $\text{C\&I/Assets}_{t-1}$, $\text{Mortgages/Assets}_{t-1}$, Unused Loan $\text{Commitments/Assets}_{t-1}$, $\triangle$ TotalBranches $\times$ Small Bank, $\triangle$ TotalBranches $\times$ Big Bank, $\triangle I$(Small Bank). Each of the controls is the last quarterly value from the previous year.

Table 3: Bank-level Credit Supply Effects

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Exposure: Fracking Wells						*Exposure*: Residential Booms					
	Branch-Tract Loans						Branch-Tract Loans					
Exp^S	0.0217**	0.0237***	0.438**	0.146	-0.137	0.909	-0.553***	-0.549***	-3.257*	-2.640	6.543	-8.139**
	(0.00848)	(0.00675)	(0.191)	(0.178)	(0.388)	(0.621)	(0.0897)	(0.0908)	(1.888)	(1.927)	(5.189)	(3.227)
$Exp^S \times RelativeLoanSh_{t-1}$		-0.120***		-0.112***	-0.172**	-0.0894		1.243**		1.139**	1.472	0.438
		(0.0398)		(0.0413)	(0.0755)	(0.0581)		(0.492)		(0.494)	(3.215)	(0.571)
$Exp^S \times RemoteCompete$			-0.496**	-0.185	0.200	-1.076			3.794**	3.245*	0.827	7.443**
			(0.197)	(0.182)	(0.425)	(0.701)			(1.918)	(1.946)	(5.840)	(3.290)
$Exp^S \times CloseToLender$			0.0344	0.0490	-0.0117	0.0980**			-0.755	-0.897	-9.257**	0.925
			(0.0441)	(0.0455)	(0.0724)	(0.0468)			(0.677)	(0.698)	(4.657)	(0.884)
Observations	1,252,884	1,252,884	1,252,878	1,252,878	788,673	416,225	660,439	660,439	660,429	660,429	390,103	209,005
Within R^2	0.123	0.123	0.123	0.123	0.0535	0.315	0.0681	0.0694	0.0681	0.0694	0.0175	0.125
Sample	Exclude Fracking	Exclude Fracking	Exclude Fracking	Exclude Fracking	Close to Competitors	Far from Competitors	Exclude RE Booms	Exclude RE Booms	Exclude RE Booms	Exclude RE Booms	Close to Competitors	Far from Competitors
Branch x Borrower's Census Tract FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Borrower's Census Tract x Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: *** p<0.01, ** p<0.05, * p<0.1.The results are based on tract-level lending for each branch. All regressions exclude branches and tracts which are directly affected by the local shocks. Exp^S is the effect of exposure for banks with less than 30 branches. *RelativeLoanSh* is defined as the average small business loans share in the census tract over the previous two years scaled so that 0 is the average share for the bank across all tracts. A positive *RelativeLoanSh* reflects above bank-average share, while a negative *RelativeLoanSh* is below bank-average share. $CloseToLender = (1/(1+BorrowerDistance))$ and $RemoteCompete = 1-(1/(1+DistanceToCompetitors))$ are scaled distances to originating branch/distance to competition. *Close to Competitors* samples include tracts with *RemoteCompete* below 0.9/0.8 for fracking/residential booms. *Far from Competitors* samples includes tract not in the *Close to Competitors* samples. Errors clustered at the branch level. All regressions include controls for bigger banks which are not reported. Controls included in the estimation but not reported include: ln Assets$_{t-1}$, Deposits/Assets$_{t-1}$, Securities/Assets$_{t-1}$, C&I/Assets$_{t-1}$, Mortgages/Assets$_{t-1}$, Unused Loan Commitments/Assets$_{t-1}$, $\triangle$ TotalBranches $\times$ Small Bank, $\triangle$ TotalBranches $\times$ Big Bank, $\triangle I$(Small Bank). Each of the controls is the quarterly average from the previous year.

Table 4: Summary Statistics for Census Tracts by Exposure to Small Banks

	Fracking Wells			Residential Booms		
	Small Banks		All	Small Banks		All
	$TractExp = 0$	$TractExp > 0$		$TractExp = 0$	$TractExp > 0$	
$TractExp$	0	0.371	0.0124	0	0.0183	0.00193
	(0)	(1.383)	(0.261)	(0)	(0.0622)	(0.0210)
$TractExp^L$	0	0.181	0.00605	0	0.0139	0.00147
	(0)	(0.921)	(0.172)	(0)	(0.0566)	(0.0189)
$TractExp^H$	0	0.190	0.00633	0	0.00440	0.000465
	(0)	(1.041)	(0.193)	(0)	(0.0276)	(0.00907)
$TractExp^L \times TractExp^H$	0	0.0242	0.000807	0	0.00000864	0.000000913
	(0)	(0.460)	(0.0842)	(0)	(0.000185)	(0.0000602)
Total Lending ($ K)	2297.1	2999.0	2320.6	2110.5	4443.3	2356.9
	(2871.8)	(2869.0)	(2874.4)	(2886.8)	(4197.3)	(3134.9)
$(HHI \leq 33^{rd})$	0.337	0.464	0.342	0.293	0.353	0.300
	(0.473)	(0.499)	(0.474)	(0.455)	(0.478)	(0.458)
$(33^{rd} < HHI \leq 66^{th})$	0.337	0.248	0.334	0.334	0.369	0.338
	(0.473)	(0.432)	(0.472)	(0.472)	(0.483)	(0.473)
$(66^{th} < HHI)$	0.326	0.288	0.324	0.373	0.278	0.363
	(0.469)	(0.453)	(0.468)	(0.484)	(0.448)	(0.481)
Total Establishments	171.7	217.5	173.2	152.1	184.8	155.6
	(163.9)	(255.6)	(168.0)	(151.4)	(158.9)	(152.5)
Share Small Establishments	0.951	0.951	0.951	0.949	0.946	0.949
	(0.0237)	(0.0206)	(0.0236)	(0.0250)	(0.0234)	(0.0248)
Share in Construction	0.100	0.0924	0.0999	0.103	0.110	0.104
	(0.0563)	(0.0543)	(0.0563)	(0.0569)	(0.0590)	(0.0571)
Share in Manufacturing	0.0337	0.0343	0.0338	0.0402	0.0409	0.0403
	(0.0226)	(0.0217)	(0.0225)	(0.0265)	(0.0259)	(0.0264)
Share in Wholesale	0.0488	0.0513	0.0489	0.0507	0.0505	0.0507
	(0.0299)	(0.0288)	(0.0298)	(0.0295)	(0.0255)	(0.0291)
Share in Retail	0.162	0.150	0.162	0.160	0.154	0.160
	(0.0498)	(0.0487)	(0.0498)	(0.0494)	(0.0461)	(0.0491)
Share in Transportation/Warehousing	0.0311	0.0273	0.0310	0.0323	0.0300	0.0320
	(0.0260)	(0.0254)	(0.0260)	(0.0258)	(0.0231)	(0.0256)
Share in Information	0.0143	0.0173	0.0144	0.0145	0.0145	0.0145
	(0.00988)	(0.00959)	(0.00989)	(0.0100)	(0.00779)	(0.00980)
Share in Finance	0.0607	0.0673	0.0610	0.0594	0.0609	0.0596
	(0.0237)	(0.0248)	(0.0238)	(0.0238)	(0.0245)	(0.0238)
Share in Real Estate	0.0442	0.0476	0.0444	0.0412	0.0401	0.0411
	(0.0185)	(0.0176)	(0.0185)	(0.0187)	(0.0163)	(0.0185)
Share in Professional Services	0.0917	0.105	0.0921	0.0841	0.0883	0.0845
	(0.0536)	(0.0616)	(0.0539)	(0.0503)	(0.0469)	(0.0500)
Share in Admin Support/Waste Man	0.0435	0.0424	0.0434	0.0410	0.0432	0.0412
	(0.0199)	(0.0167)	(0.0198)	(0.0178)	(0.0162)	(0.0177)
Share in Healthcare	0.0957	0.101	0.0959	0.0926	0.0902	0.0923
	(0.0448)	(0.0478)	(0.0449)	(0.0435)	(0.0428)	(0.0434)
Share in Accommodation/Food	0.0737	0.0748	0.0737	0.0751	0.0742	0.0750
	(0.0268)	(0.0251)	(0.0267)	(0.0268)	(0.0262)	(0.0267)
Share in Other Services	0.107	0.0966	0.107	0.112	0.108	0.112
	(0.0309)	(0.0281)	(0.0309)	(0.0311)	(0.0280)	(0.0308)

Notes: The table reports average values and standard deviations for exposure, competition, and industry-composition variables for census tracts. Tracts are divided by exposure.

Table 5: Tract Exposure and Total Credit

	Tract Exposure Fracking Banks				*Tract Exposure* Residential Boom Banks			
	(1) Total Credit	(2) Number of Loans	(3) Total Credit	(4) Number of Loans	(5) Total Credit	(6) Number of Loans	(7) Total Credit	(8) Number of Loans
$TractExp^{S,L}$	0.0282**	0.00811			-0.489***	-0.0400		
	(0.0126)	(0.00757)			(0.164)	(0.0826)		
$TractExp^{S,H}$	0.0248***	0.00382			-0.925***	-0.163		
	(0.00934)	(0.00452)			(0.330)	(0.139)		
$TractExp^{S,L} \times TractExp^{S,H}$	0.00776	-0.00878			-1.129	-9.936		
	(0.0135)	(0.00838)			(17.05)	(14.35)		
$(66^{th} < HHI_t)$ $TractExp^{S,L}$			-0.0394	-0.0220			-0.424*	0.0199
			(0.0242)	(0.0142)			(0.253)	(0.120)
$(66^{th} < HHI_t)$ $TractExp^{S,H}$			0.0279*	0.00586			-1.318**	-0.273
			(0.0166)	(0.00655)			(0.512)	(0.241)
$(66^{th} < HHI_t)$ $TractExp^{S,L} \times TractExp^{S,H}$			1.460***	1.496***			-4.341	-18.80
			(0.441)	(0.322)			(22.12)	(22.38)
$(33^{rd} < HHI_t \leq 66^{th})$ $TractExp^{S,L}$			0.00240	0.00320			-0.412**	-0.0627
			(0.0299)	(0.0158)			(0.203)	(0.114)
$(33^{rd} < HHI_t \leq 66^{th})$ $TractExp^{S,H}$			0.0159*	-0.00148			-1.236***	-0.157
			(0.00940)	(0.00467)			(0.460)	(0.187)
$(33^{rd} < HHI_t \leq 66^{th})$ $TractExp^{S,L} \times TractExp^{S,H}$			0.298***	0.201**			4.874	-2.395
			(0.0844)	(0.0880)			(27.56)	(12.35)
$(HHI_t \leq 33^{rd})$ $TractExp^{S,L}$			0.0586***	0.0184**			-0.716***	-0.109
			(0.0120)	(0.00919)			(0.224)	(0.103)
$(HHI_t \leq 33^{rd})$ $TractExp^{S,H}$			0.0191*	-0.00344			0.0186	-0.0379
			(0.0114)	(0.00575)			(0.425)	(0.145)
$(HHI_t \leq 33^{rd})$ $TractExp^{S,L} \times TractExp^{S,H}$			-0.0186	-0.0215***			28.07	39.17
			(0.0113)	(0.00719)			(54.06)	(36.91)
Observations	368,173	368,173	368,173	368,173	305,346	305,346	305,346	305,346
R-squared	0.878	0.928	0.878	0.928	0.875	0.906	0.876	0.906
Census Tract x Bank Size	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
County x Bank Size x Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cluster	Tract	Tract	Tract	Tract	Tract	Tract	Tract	Tract

Notes: *** p<0.01, ** p<0.05, * p<0.1. Results are based on tract level information for total credit from small and big banks. Columns (1), (3), (5), and (7) use the total amount of small business loans. The rest of the estimates are based on the total number of loans. $TractExp^{S,L}/TractExp^{S,H}$ is the tract loan-weighted average exposure to small lenders with blow-average/above-average lagged market shares. $I(66^{th} < HHI_t)$, $I(33^{rd} < HHI_t \leq 66^{th})$, and $I(33^{rd} < HHI_t \leq 66^{th})$ are indicators for the relative competitiveness of the market based on the 33rd and 66th percentiles. All regressions include but do not report controls for exposure to big lenders.

Table 6: Tract Exposure and Economic Activity

		Tract Exposure Fracking Banks			*Tract Exposure* Boom Banks	
		(1)	(2)	(3)	(4)	(5)
		Number of Establishments			Number of Establishments	
	$TractExp^{S,L}$	0.0117***			0.0458***	
		(0.00196)			(0.0165)	
	$TractExp^{S,H}$	0.00525***			0.0497	
		(0.00168)			(0.0342)	
	$TractExp^{S,L} \times TractExp^{S,H}$	-0.00478**			1.758	
		(0.00199)			(4.548)	
$(66^{th} < HHI_t)$	$TractExp^{S,L}$		0.0119*	0.0120*		0.0522**
			(0.00670)	(0.00670)		(0.0236)
	$TractExp^{S,H}$		0.00970***	0.00969***		-0.0128
			(0.00343)	(0.00343)		(0.0405)
	$TractExp^{S,L} \times TractExp^{S,H}$		0.153*	0.152*		11.18**
			(0.0902)	(0.0902)		(5.406)
$(33^{rd} < HHI_t \leq 66^{th})$	$TractExp^{S,L}$		0.00883***			0.0405**
			(0.00320)			(0.0206)
	$TractExp^{S,L} \times$ *I(Far Compete)*			0.00747*		
				(0.00404)		
	$TractExp^{S,L} \times$ *I(Close Compete)*			0.0128***		
				(0.00181)		
	$TractExp^{S,H}$		0.00325*			0.0277
			(0.00174)			(0.0397)
	$TractExp^{S,H} \times$ *I(Far Compete)*			0.00351*		
				(0.00183)		
	$TractExp^{S,H} \times$ *I(Close Compete)*			-0.000613		
				(0.00324)		
	$TractExp^{S,L} \times TractExp^{S,H}$		-0.00176			-8.415
			(0.00757)			(5.717)
$(HHI_t \leq 33^{rd})$	$TractExp^{S,L}$		0.0128***	0.0129***		0.0472
			(0.00198)	(0.00198)		(0.0297)
	$TractExp^{S,H}$		0.00361	0.00364		0.174**
			(0.00240)	(0.00240)		(0.0864)
	$TractExp^{S,L} \times TractExp^{S,H}$		-0.00530***	-0.00530***		-12.37
			(0.00186)	(0.00186)		(10.85)
Observations		6,441,597	6,441,597	6,441,597	5,478,556	5,478,556
Within R^2		0.00366	0.00366	0.00366	0.00292	0.00292
Census Tract x Industry x Size FE		Yes	Yes	Yes	Yes	Yes
County x Year FE		Yes	Yes	Yes	Yes	Yes
Cluster		Tract	Tract	Tract	Tract	Tract

Notes: *** p<0.01, ** p<0.05, * p<0.1. Results are based on the number of establishments by industry/size in each census tract. The table lists coefficient estimates for the case of small establishments. $TractExp^{S,L}/TractExp^{S,H}$ is the tract loan-weighted average exposure to small lenders with blow-average/above-average lagged market shares.. $I(66^{th} < HHI_t)$, $I(33^{rd} < HHI_t \leq 66^{th})$, and $I(33^{rd} < HHI_t \leq 66^{th})$ are indicators for the relative competitiveness of the market based on the 33rd and 66th percentiles. All regressions include but do not report effect on big establishments, controls for exposure to big lenders and the $\triangle InvHHI$ effect for each bank size.

Table 7: Robustness: Bank-level Credit Supply Effects

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Exposure: Fracking Wells					*Exposure*: Residential Booms				
	Concentr	Branch Loans	Branch-Tract Loans			Concentr	Branch Loans	Branch-Tract Loans		
$Exp^S \times I(\bar{GINI} \leq 33^{rd})$	0.00555***					-0.00407				
	(0.000373)					(0.0332)				
$Exp^S \times I(33^{rd} < \bar{GINI} \leq 66^{th})$	2.29e-05					-0.00270				
	(0.000829)					(0.0180)				
$Exp^S \times I(66^{th} < \bar{GINI})$	0.000110					0.102***				
	(0.00166)					(0.0392)				
Exp^S		0.0457***	0.0217**	0.146	0.337*		-0.515***	-0.553***	-2.640	-1.976
		(0.0142)	(0.00848)	(0.178)	(0.182)		(0.138)	(0.0897)	(1.927)	(2.180)
$Exp^S \times LoanSh_{t-1}$				-0.112***	-0.104***				1.139**	1.521**
				(0.0413)	(0.0373)				(0.494)	(0.705)
$Exp^S \times LoanSh_{t-1} \times Sh\ Construction$					-0.380					33.41*
					(1.742)					(18.06)
$Exp^S \times LoanSh_{t-1} \times Sh\ Manufacturing$					-4.895**					15.37
					(2.467)					(27.53)
$Exp^S \times LoanSh_{t-1} \times Sh\ Wholesale$					-2.284					53.18**
					(1.558)					(22.88)
$Exp^S \times LoanSh_{t-1} \times Sh\ Retail$					1.328					36.20*
					(1.717)					(20.06)
$Exp^S \times LoanSh_{t-1} \times Sh\ Admin\ and\ Support$					4.650*					50.66
					(2.549)					(32.01)
$Exp^S \times LoanSh_{t-1} \times Sh\ Health\ Care$					-1.196					27.87*
					(1.391)					(16.87)
$Exp^S \times RemoteCompete$				-0.185	-0.379**				3.245*	3.007
				(0.182)	(0.184)				(1.946)	(2.228)
$Exp^S \times CloseToLender$				0.0490	0.0364				-0.897	-1.333*
				(0.0455)	(0.0487)				(0.698)	(0.718)
Observations	3,195	345,427	1,252,884	1,252,878	1,097,636	2,779	106,990	660,439	660,429	582,376
Within R^2	0.689	0.819	0.123	0.123	0.126	0.674	0.895	0.0681	0.0694	0.0670
Sample	Full	Full	Full	Full	Full	Full	Full	Full	Full	Full

Notes: *** p<0.01, ** p<0.05, * p<0.1. Exp^S is the effect of exposure for banks with less than 30 branches. $\bar{GINI}$ is the bank average of loan concentration for each bank over the entire sample. *LoanSh* is defined as the average small business loans share in the census tract over the previous two years. $CloseToLender/RemoteCompete$ are scaled distance to originating branch/distance to competition as defined in the main text. Columns (1) and (6) are based on concentration of bank small business lending portfolio, defined as the GINI coefficient of tract loan concentration. Column (2) and (6) are based on branch-level lending and include a branch fixed effect and a town-of-branch by year fixed effect. The rest are based on branch-tract loans. *Sh* refers to the share of the respective industry only for establishments with less than 50 employees. The table reports only the marginally significant shares. Controls included in the estimation but not reported include: ln $Assets_{t-1}$, $Deposits/Assets_{t-1}$, $Securities/Assets_{t-1}$, $C\&I/Assets_{t-1}$, $Mortgages/Assets_{t-1}$, Unused Loan $Commitments/Assets_{t-1}$, $\triangle$ TotalBranches $\times$ Small Bank, $\triangle$ TotalBranches $\times$ Big Bank, $\triangle I$(Small Bank). Each of the controls is the quarterly average from the previous year.

Table 8: Robustness: Tract Exposure, Total Credit, and Competition

	Tract Exposure Fracking Banks				*Tract Exposure* Residential Boom Banks			
	(1) Total Credit	(2) Number of Loans	(3) Total Credit	(4) Number of Loans	(5) Total Credit	(6) Number of Loans	(7) Total Credit	(8) Number of Loans
$TractExp^s$	0.0268***	0.00782*			-0.568***	-0.0640		
	(0.00828)	(0.00458)			(0.147)	(0.0703)		
$TractExp^s \times \triangle InvHHI$	-0.0503	0.0680			-2.271**	-0.913*		
	(0.0779)	(0.0528)			(1.129)	(0.469)		
$I(66^{th} < HHI_t) \times TractExp^s$			0.00818	0.0124			-0.620**	-0.0594
			(0.0185)	(0.00863)			(0.247)	(0.107)
$I(66^{th} < HHI_t) \times TractExp^s \times \triangle InvHHI$			-0.0973	0.0353			-3.286**	-1.385**
			(0.101)	(0.0601)			(1.527)	(0.656)
$I(33^{rd} < HHI_t \leq 66^{th}) \times TractExp^s$			0.0184	0.00995			-0.652***	-0.0963
			(0.0118)	(0.00752)			(0.191)	(0.100)
$I(33^{rd} < HHI_t \leq 66^{th}) \times TractExp^s \times \triangle InvHHI$			-0.0167	0.133			0.466	-0.0362
			(0.156)	(0.0966)			(2.088)	(0.824)
$I(HHI_t \leq 33^{rd}) \times TractExp^s$			0.0376***	0.00612			-0.522***	-0.113
			(0.00908)	(0.00548)			(0.199)	(0.0906)
$I(HHI_t \leq 33^{rd}) \times TractExp^s \times \triangle InvHHI$			-0.241	0.240**			-3.320	0.0591
			(0.161)	(0.117)			(2.567)	(0.911)
Observations	368,173	368,173	368,173	368,173	305,346	305,346	305,346	305,346
R-squared	0.878	0.928	0.878	0.928	0.875	0.906	0.876	0.906
Census Tract x Bank Size	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
County x Bank Size x Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cluster	Tract	Tract	Tract	Tract	Tract	Tract	Tract	Tract

Notes: *** p<0.01, ** p<0.05, * p<0.1. Results are based on tract level information for total credit from small and big banks. Columns (1), (3), (5), and (7) use the total amount of small business loans. The rest of the estimates are based on the total number of loans. $TractExp^s$ is the tract loan-weighted average exposure to small lenders. $\triangle InvHHI$ is the change in the inverse of HHI where 1 represents a perfectly competitive market. $I(66^{th} < HHI_t)$, $I(33^{rd} < HHI_t \leq 66^{th})$, and $I(33^{rd} < HHI_t \leq 66^{th})$ are indicators for the relative competitiveness of the market based on the 33rd and 66th percentiles. All regressions include but do not report controls for exposure to big lenders and the $\triangle InvHHI$ effect for each bank size.

Table 9: Robustness: Tract Exposure, Economic Activity, and Competition

	Tract Exposure Fracking Banks			*Tract Exposure* Boom Banks		
	(1)	(2)	(3)	(4)	(5)	(6)
	Number of Establishments			Number of Establishments		
$TractExp^s$	0.00809***			0.0475***		
	(0.00149)			(0.0152)		
$TractExp^s \times \triangle InvHHI$	-0.000796			0.168*		
	(0.0142)			(0.0887)		
$I(66^{th} < HHI_t) \times TractExp^s$		0.00923**	0.00867**		0.0467*	0.0798
		(0.00421)	(0.00407)		(0.0241)	(0.0504)
$I(66^{th} < HHI_t) \times TractExp^s \times \triangle InvHHI$		-0.00970	0.0103		0.0448	0.178
		(0.0205)	(0.0214)		(0.115)	(0.227)
$I(33^{rd} < HHI_t \leq 66^{th}) \times TractExp^s$		0.00571***	-0.000519		0.0262	0.0594*
		(0.00204)	(0.00318)		(0.0205)	(0.0330)
$I(33^{rd} < HHI_t \leq 66^{th}) \times TractExp^s \times \triangle InvHHI$		0.00675	-0.00751		0.294	0.0441
		(0.0232)	(0.0402)		(0.196)	(0.483)
$I(HHI_t \leq 33^{rd}) \times TractExp^s$		0.00916***	0.00392*		0.0508*	0.0391
		(0.00168)	(0.00223)		(0.0274)	(0.0532)
$I(HHI_t \leq 33^{rd}) \times TractExp^s \times \triangle InvHHI$		0.0578**	0.0815**		0.676**	0.963
		(0.0275)	(0.0393)		(0.295)	(0.754)
Observations	6,441,597	6,441,597	6,441,597	5,478,556	5,478,556	5,478,556
R-squared	0.954	0.954	0.954	0.970	0.970	0.970
Census Tract x Industry x Size FE	Yes	Yes	Yes	Yes	Yes	Yes
County x Year FE	Yes	Yes		Yes	Yes	
Census Tract x Year FE			Yes			Yes
Cluster	Tract	Tract	Tract	Tract	Tract	Tract

Notes: *** p<0.01, ** p<0.05, * p<0.1. Results are based on the number of establishments by industry/size in each census tract. The table lists coefficients for small establishments. $TractExp^s$ is the tract loan-weighted average exposure to small lenders. $\triangle InvHHI$ is the change in the inverse of HHI where 1 represents a perfectly competitive market. $I(66^{th} < HHI_t)$, $I(33^{rd} < HHI_t \leq 66^{th})$, and $I(33^{rd} < HHI_t \leq 66^{th})$ are indicators for the relative competitiveness of the market based on the 33rd and 66th percentiles. All regressions include but do not report effect on big establishments, controls for exposure to big lenders and the $\triangle InvHHI$ effect for each bank size.

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Appendix (for online publication only)

Appendix 1: Robustness

Table A1: Profitability of Exposure to Different Residential Booms

	Appreciation > 91^{st}		Appreciation > 93^{rd}		Appreciation > 95^{th}		Appreciation > 97^{th}	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Yield	NIM	Yield	NIM	Yield	NIM	Yield	NIM
$Exp^s_{i,t}$	0.0324	0.0538	0.0831**	0.0892***	0.0954**	0.0910**	0.113***	0.0956***
	(0.0372)	(0.0321)	(0.0342)	(0.0314)	(0.0373)	(0.0342)	(0.0367)	(0.0323)
$Exp^b_{i,t}$	-0.0205	0.0177	-0.0335	0.00977	-0.0991	-0.0583	-0.116	-0.207
	(0.145)	(0.125)	(0.158)	(0.154)	(0.220)	(0.197)	(0.347)	(0.310)
Observations	5,874	5,874	5,874	5,874	5,874	5,874	5,874	5,874
R-squared	0.921	0.902	0.921	0.902	0.921	0.902	0.921	0.902
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State x Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cluster	Bank, State	Bank, State	Bank, State	Bank, State	Bank, State	Bank, State	Bank, State	Bank, State

Notes: *** p<0.01, ** p<0.05, * p<0.1.$Exp^s_{i,t}/Exp^b_{i,t}$ is the weighted fraction of branches in residential booms defined as the corresponding percentile of residential appreciation. Yield is the return on earning assets. NIM is net interest margin. Residential booms sample covers the period from 2000 to 2005. Controls included in the estimation but not reported include: ln $Assets_{t-1}$, Deposits/$Assets_{t-1}$, Securities/$Assets_{t-1}$, C&I/$Assets_{t-1}$, Mortgages/$Assets_{t-1}$, Unused Loan Commitments/$Assets_{t-1}$, $\triangle$ TotalBranches $\times$ Small Bank, $\triangle$ TotalBranches $\times$ Big Bank, $\triangle I$(Small Bank). Each of the controls is the quarterly average from the previous year.

Appendix 2: Data

CRA Census Tract Lending

Each bank that falls under the CRA reporting criteria is required to submit to the Federal Financial Institutions Examination Council (FFIEC) detailed information on each of the new small business loans it has originated between January 1st and December 31st of each year. A small business loan is defined as either a commercial and industrial (C&I) loan or a loan secured by nonresidential real estate with amount of less than $1 million. The bank is to disclose for each loan the location of the borrower (census tract) and the amount of the loan that has been extended. This detailed information is processed by the FFIEC and after extensive review for accuracy is released to the public. To preserve the privacy of the customers of each bank the public information aggregates the total gross originations into three categories – less than $100,000, between $100,000 and $250,000, and between $250,000 and $1,000,000. Only the totals within each category are reported. Additionally, the bank reports total originations to firms with revenue below $1,000,000. This study uses all of the small business loan originations by adding the total amounts originated in each of the subcategories listed above. The geographical information is aggregated to the county level where separate totals are reported for the metropolitan and the non-metropolitan area of the county (if applicable). Within the MSA-county and the nonMSA-county areas further distinction is made between the origination amounts extended across different income level areas (based on the census tract income level). Since each bank is required to report the census tracts and the income level at each census tract where at least one new loan was extended I am able to decrease the level of aggregation in the public disclosures. This information allows me to eliminate the census tracts where no loans are originated. The total origination amounts for a given MSA-county or nonMSA-county across different income levels are distributed equally to all of the census tracts according to the particular income level. If there's only one census tract with a particular income level within the county area this census tract gets the precise amount of originations.

Branch Locations

The second source of data for this paper comes from the Summary of Deposits information maintained by the Federal Deposit Insurance Corporation (FDIC). FDIC provides a list of addresses of all active physical branches of all commercial banks and thrifts that are in operation in a given year. For example, the 2000 file includes 85,493 branches of all banks in operation[28]. Of the 85,493 locations about 86% have the precise branch GPS coordinates while the remaining 14% only list an address. The branches with missing coordinates were geo-coded separately for each year based on the US address[29]. Consequently, each of the bank branches in operation for the period between 2000 and 2009 was associated with a particular GPS-coordinate location[30].

[28]This number excludes ATM locations.
[29]This was done with the geo-coding service SmartyStreets.
[30]Some of the addresses are not very accurate and this is reflected in the precision of the GPS coordinates.

Matching Bank Networks Over the Sample Period

The final step in the creation of the dataset has to do with the associations of bank networks over time. It is customary in this literature to use a method called force-merging that will account for mergers and acquisitions of banks over the years. This method merges the balance sheet of two or more banks in the year before the merger occurs and thus maintain the relative size of the assets and liabilities between the two years. This paper deviates from this practice. In what is described above, I have assumed that a given client of a bank receives a loan from the closest super-branch of that bank. To use the force-merging method I will have to assume that the client of a bank can choose to go to a super-branch of the actual bank that has extended the loan *or* to a super-branch of the bank that merges with the first bank in the following period. This is obviously inconsistent. The method that this paper uses instead is to match the spatial distribution of a bank network at two different points in time. The nodes of a network of a bank in one year are matched with only those nodes that exist in the following year in the same location and belong to the same bank. The dataset, therefore, only includes observations for networks that report under the CRA for at least two consecutive years and at least one node of the network is in the same location between the two years.

Aggregation of Census Tracts to ZIP Code Areas

The CRA information is provided at the census tract level while the CBP information on the number of establishments is provided at the USPS ZIP code level. The census tracts are slightly smaller than the ZIP areas so I aggregate the CRA information to the ZIP code level. To do this I overlay the ZIP areas over the census tracts and compute the percentage of the area of each ZIP area that is comprised of each census tract that overlaps with the ZIP area. Average exposure is converted from the census tract level to the ZIP level using percentage of total area as a weight.